جمهورية مصر العربية

وزارة التربية والتعليم
والتعليم الفني

نموذج إجابة
امتحان شهادة إتمام الدراسة الثانوية العامة
للعام الدراسى ٢٠١٦/٢٠١٧ - الدور الأول
المـــادة : الاستاتيكا (باللغة الانجليزية)

نموذج

أ

1-

Answer: (a) $\frac{2}{5}$ (1)

2-

Answer (c) $]0,1]$ (1)

3-

(a) $\vec{r} = \vec{BA} = \vec{A} - \vec{B}$

$\vec{r} = (1,-1,4) - (2,-3,1) = (-1,2,3)$ ($\frac{1}{2}$)

$\therefore \vec{M}_B = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ -1 & 2 & 3 \\ 2 & 3 & -1 \end{vmatrix}$ ($\frac{1}{2}$) $= -11\vec{i} + 5\vec{j} - 7\vec{k}$ (1)

The length of perpendicular $= \frac{\|\vec{M}_B\|}{\|\vec{F}\|}$ ($\frac{1}{2}$) $= \frac{\sqrt{121+25+49}}{\sqrt{4+9+1}} = \frac{\sqrt{195}}{\sqrt{14}} \simeq 3.73$ length unit (1)

(b) $\vec{R} = \vec{F_1} + \vec{F_2} + \vec{F_3}$ ($\frac{1}{2}$) $= 4\vec{i} - 3\vec{j}$ ($\frac{1}{2}$)

$\vec{M}_B = \vec{BA} \times \vec{R}$

$= (\vec{A} - \vec{B}) \times \vec{R}$ ($\frac{1}{2}$)

$= (-4\vec{i} - 2\vec{j}) \times (4\vec{i} - 3\vec{j})$

$= (12 + 8)\vec{k}$

$= 20\vec{k}$ ($\frac{1}{2}$)

$\ell = \frac{\|\vec{M}_B\|}{\|\vec{R}\|} = \frac{20}{\sqrt{16+9}}$ ($\frac{1}{2}$) $= 4$ length unit ($\frac{1}{2}$)

4-

Answer (b) -2 (1)

5-

Answer: (a) - 120 (1)

6-

$\because 400 \sin 30 > 50$

$\therefore$ The direction of the friction force F is upwards. (1/2)

$\therefore 50 + F = w \sin 30°$

$50 + F = 400 \times \frac{1}{2}$ (1/2)

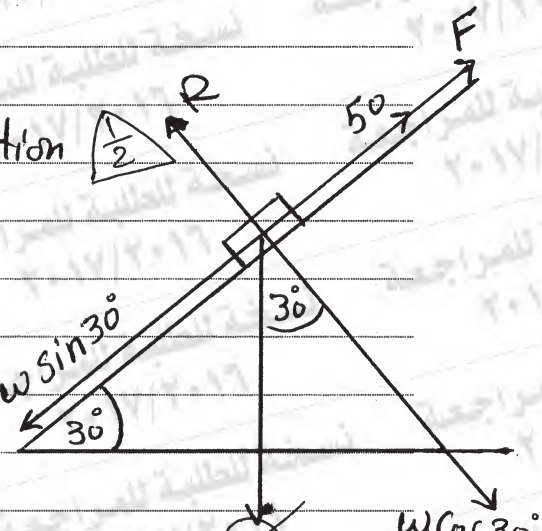
$F = 200 - 50 = 150$ gm.wt

$\because MR = \frac{\sqrt{3}}{4} \times 400 \cos 30°$

$\therefore MR = \frac{\sqrt{3}}{4} \times 400 \times \frac{\sqrt{3}}{2} = 150$ gm.wt. (1/2)

$\because F = MR$

$\therefore$ The body is about to move. (1/2)



7-

Answer (a) 10 (1)

8-

Answer: (d) 4 (1)

9-

$R = 12 - 7 = 5$ newton $\frac{1}{2}$

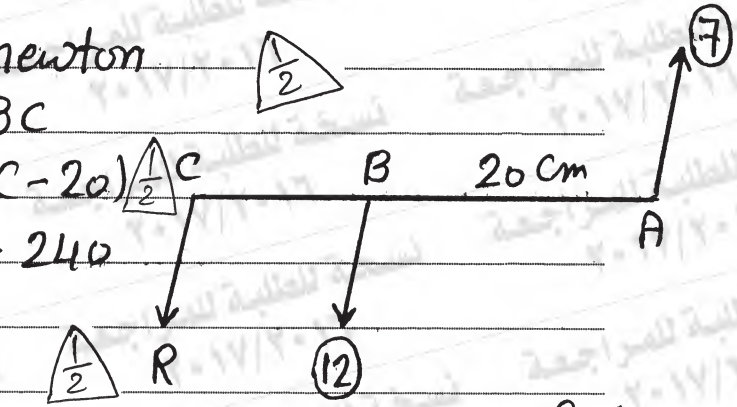
$7 \times AC = 12 \times BC$

$7AC = 12(AC - 20)$ $\frac{1}{2}$

$7AC = 12AC - 240$

$5AC = 240$

$AC = 48$ cm. $\frac{1}{2}$



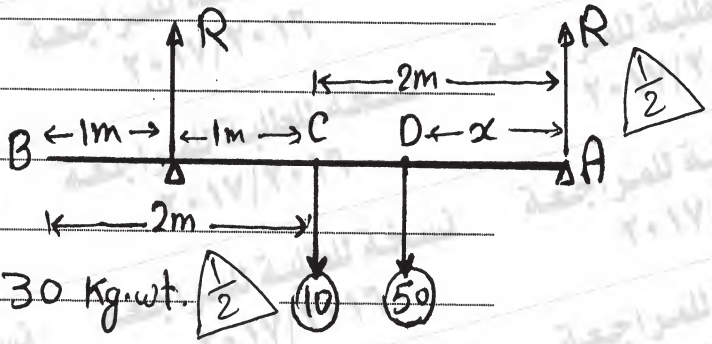
∴ R = 5 newton act in the direction of the force 12 newton and its point of action apart from A by 48 cm. , 28 cm from B $\frac{1}{2}$

10-

Answer: (c) 3 (1)

11-

Let AD = x m



(1/2)

From equilibrium

$2R = 10 + 50$

$2R = 60 \Rightarrow R = 30$ Kg.wt. (1/2)

$M_A = Zero$

$\therefore 50x + 10 \times 2 - 30 \times 3 = 0$ (1/2)

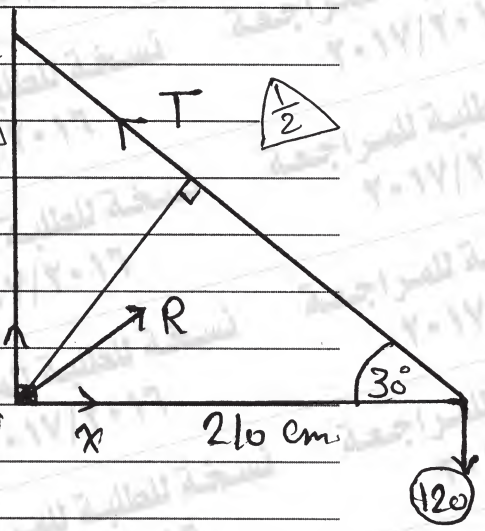
$50x + 20 - 90 = 0$

$50x = 70$

$x = \frac{7}{5}$ m (1/2)

∴ The child stand at $\frac{7}{5}$ m apart of A.

12-



(a) $\frac{AC}{AB} = \tan 30 = \frac{\sqrt{3}}{3}$

$\therefore AC = 210 \times \frac{\sqrt{3}}{3} = 70\sqrt{3}$ (1/2)

From equilibrium:

$\because X = 0$

$\therefore -T\cos 30^\circ + x = 0$

$x = \frac{\sqrt{3}}{2} T$ (1) (1/2)

$\because y = 0$

$\therefore y + T\sin 30^\circ - 120 = 0$

$\frac{1}{2} T + y = 120$ (2) (1/2)

$\because M_A = 0$

$T \times 210 \sin 30^\circ - 120 \times 210 = 0$

$T \sin 30^\circ = 120 \quad \therefore T = 240$ newton (1/2)

From (1) $X = \frac{\sqrt{3}}{2} \times 240 = 120\sqrt{3}$ newton

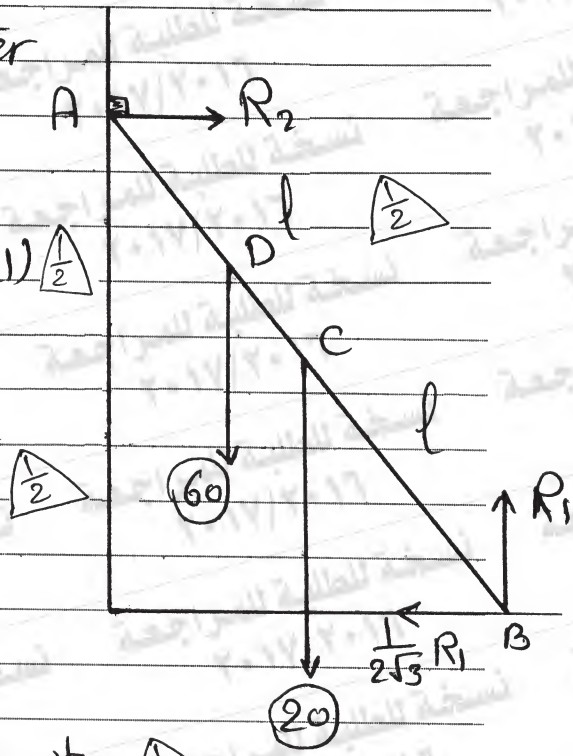
From (2) $y = 120 - \frac{1}{2} \times 240 =$ zero

$R = 120\sqrt{3}$ newton in the direction of $\overrightarrow{AB}$ (1/2)

b

let AB = 2ℓ meter

BD = 2x meter



$\therefore x = 0$

$\therefore R_2 = \frac{1}{2\sqrt{3}} R_1$ (1) ½

$\because y = 0$

$\therefore R_1 = 60 + 20$

$R_1 = 80$ Kg.wt. ½

From (1)

$R_2 = \frac{1}{2\sqrt{3}} \times 80$

$R_2 = \frac{40\sqrt{3}}{3}$ Kg.wt ½

$\because M_B = 0$

$\therefore 20 \times \ell \cos 60° + 60 \times x \cos 60° - \frac{40\sqrt{3}}{3} \times 2\ell \sin 60° = 0$ ½

$10\ell + 30x - 40\ell = 0$

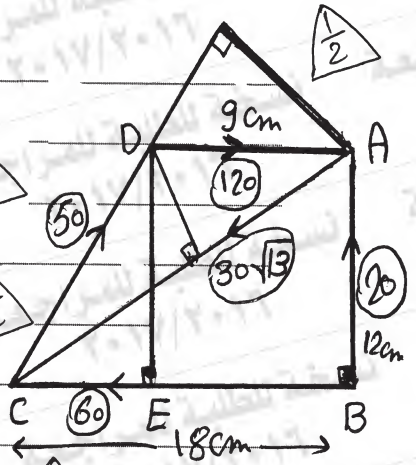
$30x = 30\ell \Rightarrow x = \ell$ ½

∴ The maximum distance that the girl can ascend = ½ the length of the ladder.

13-

Answer: (b) 2 (1)

14-



$\therefore DE = 12cm$ (1/2)

$\therefore CE = EB = 9cm.$

$DC = 15cm, AC = 6\sqrt{13}\ cm$ (1/2)

$M_C = 20 \times 18 - 120 \times 12$

$M_C = -1080\ gm.wt.cm$ (1) (1/2)

$M_A = -50 \times 9 \times \frac{4}{5} - 60 \times 12$

$M_A = -1080\ gm.wt.cm$ (2) (1/2)

$M_D = 20 \times 9 - 60 \times 12 - 30\sqrt{3} \times 9 \times \frac{12}{6\sqrt{13}} = -1080\ gm.wt.cm$ (3) (1/2)

From (1), (2) and (3)

$\therefore M_A = M_D = M_C = -1080\ gm.wt.cm.$

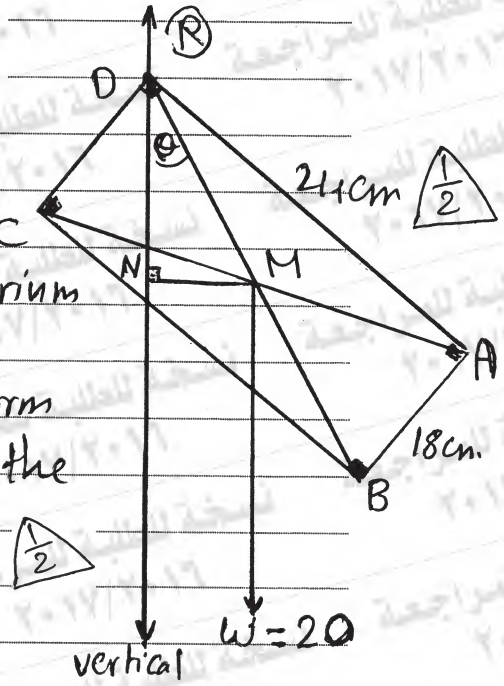
$\therefore$ The system is equivalent to a couple whose moment $= \pm 1080\ gm.wt.cm.$ (1/2)

Another solution; $X = 0, Y = 0$

$M_C = -1080\ gm.wt.cm$

$\therefore$ The system is equivalent to a couple whose moment $= \pm 1080\ gm.wt.cm$

15-



From the graph: $BD = \sqrt{18^2+24^2}$ ½

$\therefore BD = 30\,cm.$

∵ the lamina is in an equilibrium Posith'on

∴ the two forces R & w form a Couple equilibrium with the given couple.

$\therefore R = W = 20$ newton. ½

$M_1 + M_2 = zero$ ½

$150 - 20\,MN = 0$

$MN = \frac{150}{20} = 7.5\,cm$ ½

$MD = \frac{1}{2}BD = 15\,cm$

$\sin\theta = \frac{MN}{MD} = \frac{7.5}{15} = \frac{1}{2}$ ½

$\therefore \theta = 30°$ ½

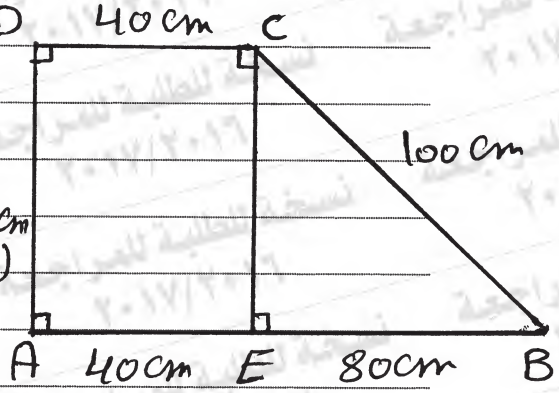
16-

Answer (b) 4 (1)

17-

Answer: (a) (3,3) (1)

18-



∵ The ratios of the weights = the ratios of the areas
= area of rectangle (AECD) : area of (Δ ECB)

$= 40 \times 60 : \frac{1}{2} \times 80 \times 60$ (1/2)

$= 1 : 1$

figure	mass	x	y
AECD	m	20	30
Δ ECB	m	$\frac{200}{3}$	20

(1/2)

$x_G = \frac{20m + \frac{200}{3}m}{m+m} = \frac{130}{3}$ cm (1/2)

$y_G = \frac{30m + 20m}{m+m} = 25$ cm (1/2)

(انتهت الإجابة وتراعى الحلول الأخرى)